

WHAT IS CLAIMED IS:

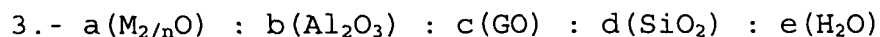
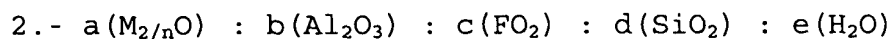
1. A metalloaluminosilicate composition comprising an aluminosilicate composition having an aluminosilicate framework and containing at least one metal, wherein a substantial portion of said metal is incorporated into the aluminosilicate framework.

2. The composition of claim 1, wherein said composition has a surface content of said metal and a bulk content of said metal, and wherein said bulk content is greater than said surface content.

3. The composition of claim 1, wherein the metal comprises at least one metal selected from the group consisting of iron, zinc, zirconium, chromium, nickel, cobalt, magnesium, phosphorous, gallium and mixtures thereof.

4. A composition of claim 1, wherein the metal comprises at least one metal selected from the group consisting of iron, zinc and mixtures thereof.

5. A composition according to claim 1, wherein the composition has mole ratios of oxides according to an equation selected from the following:



where M is at least one ion-exchangeable cation having a valence of n; E is an element with valence 3+; F is an element with valence 4+; G is an element with valence 2+; H is an element with valence 5+; a is from >0 to 6; b is equal to 1, c is from >0 to 10; d is from 10 to 80; d/c is from 10 to 1500; e is from 0 to 100; a/(b+c) is from >0 to 5; and d/(b+c) is from 10 to 70.

6. A method for preparing a metalloaluminosilicate, comprising the steps of:

providing a solution containing a silica source;

providing a solution containing an alumina source;

providing an aqueous acid solution containing a metal other than silicon or aluminum;

mixing the silica source solution with the aqueous acid solution so as to form a silica source-metal containing mixture;

mixing the silica source-metal containing mixture with the alumina source solution so as to provide a gel mixture; and

hydrothermally crystallizing the gel mixture so as to provide a metalloaluminosilicate material having an aluminosilicate framework and having a substantial portion of the metal incorporated into the aluminosilicate framework.

7. The method of claim 6, wherein said composition has a surface content of said metal and a bulk content of said metal, and wherein said bulk content is greater than said surface content.

8. The method of claim 6, wherein the metal comprises at least one metal selected from the group consisting iron, zinc, zirconium, chromium, nickel, cobalt, magnesium, phosphorous, gallium and mixtures thereof.

9. The method of claim 6, wherein the metal is selected from the group consisting of iron, zinc and mixtures thereof.

10. The method of claim 6, wherein the gel mixture has a composition in molar ratios as follows:

$\text{SiO}_2/\text{Al}_2\text{O}_3$  from 5 to 80,

$\text{SiO}_2/\text{DO}_x$  from 10 to 1500,

$\text{SiO}_2/(\text{Al}_2\text{O}_3 + \text{DO}_x)$  from 5 to 70,

$\text{Na}_2\text{O}/\text{SiO}_2$  from 0.22 to 2.20,

$\text{OH}/\text{SiO}_2$  from 0.01 to 2.00,

$\text{H}_2\text{O}/\text{SiO}_2$  from 14 to 40,

where D is the metal.

11. The method of claim 6, wherein the metalloaluminosilicate has a composition expressed in mole ratios of oxides according to an equation selected from the following:

1.-  $a(\text{M}_{2/n}\text{O}) : b(\text{Al}_2\text{O}_3) : c(\text{E}_2\text{O}_3) : d(\text{SiO}_2) : e(\text{H}_2\text{O})$

2.-  $a(\text{M}_{2/n}\text{O}) : b(\text{Al}_2\text{O}_3) : c(\text{FO}_2) : d(\text{SiO}_2) : e(\text{H}_2\text{O})$

3.-  $a(\text{M}_{2/n}\text{O}) : b(\text{Al}_2\text{O}_3) : c(\text{GO}) : d(\text{SiO}_2) : e(\text{H}_2\text{O})$

4.-  $a(\text{M}_{2/n}\text{O}) : b(\text{Al}_2\text{O}_3) : c(\text{H}_2\text{O}_5) : d(\text{SiO}_2) : e(\text{H}_2\text{O})$

where M is at least one ion-exchangeable cation having a valence of  $n$ ; E is an element with valence  $3+$ ; F is an element with valence  $4+$ ; G is an element with valence  $2+$ ; H is an element with valence  $5+$ ; a is from  $>0$  to 6; b is equal to 1, c is from  $>0$  to 10; d is from 10 to 80;  $d/c$  is from 10 to 1500; e is from 0 to 100;  $a/(b+c)$  is from  $>0$  to 5; and  $d/(b+c)$  is from 10 to 70.

12. The method of claim 6, wherein the hydrothermally crystallizing step is carried out at a temperature of between about  $150^{\circ}\text{C}$  and about  $220^{\circ}\text{C}$  under autogenous pressure for a period of at least about 24 hours.

13. The method of claim 6, wherein the hydrothermally crystallizing step is carried out at a temperature of between about  $165^{\circ}\text{C}$  and about  $185^{\circ}\text{C}$  under autogenous pressure for a period of at least about 24 hours.

14. The method of claim 6, wherein the step of hydrothermally crystallizing further comprises the steps of filtering and washing the metalloaluminosilicate material to provide a separated metalloaluminosilicate and drying the separated metalloaluminosilicate to provide a metalloaluminosilicate product.

15. The method of claim 14, wherein the drying step is carried out at a temperature of between about 80°C and about 140°C.

16. The method of claim 6, wherein the step of providing the silica source solution comprises dissolving sodium silicate in distilled water.

17. The method of claim 6, wherein the step of providing the alumina source solution comprises dissolving sodium aluminate in distilled water.

18. The method of claim 6, wherein the step of providing the aqueous acid solution comprises the steps of providing an acid solution and dissolving a metal salt in the acid solution.

19. The method of claim 18, wherein the acid solution comprises an aqueous solution of an acid selected from the group consisting of sulfuric acid, nitric acid, hydrochloric acid and mixtures thereof.

20. The method of claim 6, further comprising the step of mixing the gel mixture so as to provide a substantially homogeneous gel mixture, and hydrothermally crystallizing the substantially homogeneous gel mixture.

21. The method of claim 6, wherein the step of mixing the silica source solution with the aqueous acid solution is carried out under continuous mixing so as to provide a substantially homogeneous silica source-metal containing mixture and wherein the step of mixing the silica source-metal containing mixture is carried out under continuous mixing for a period of time sufficient to provide a substantially homogeneous gel mixture.

22. The method of claim 6, further comprising the step of converting the metalloaluminosilicate material to protonic form.

23. The method of claim 22, wherein the converting step is an ion exchange step.